Incisional Complications and Cosmetic Evaluation After Hand-assisted Retroperitoneoscopic Donor Nephrectomy

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ABSTRACT

Purpose. Hand-assisted retroperitoneoscopic (HARP) donor nephrectomy prevents major complications, but incision site complications may be more frequent in hand-assisted approach. We evaluated long-term incisional complication rates and cosmetic outcomes after HARP donor nephrectomy in our series.

Materials and Methods. A total of 609 donors who underwent nephrectomy between February 2009 and June 2016 were invited for physical examination and face-to-face interview. A total of 209 donors (35.3%) participated to the study. Sex, age, body mass index (BMI), mean follow-up period, incision-related outcomes of cosmesis, and postoperative complications were evaluated. Body image scale (BIS) and cosmetic scale (CS) (scar test) questionnaires were applied. Higher cosmesis and body image scores indicated greater satisfaction.

Results. A total of 191 donors had paramedian (91.4%), and 18 donors had Pfannenstiel incision (8.6%); 121 donors were female (57.9%). The donor mean age and BMI were 49.1 (SD, 1.8) years and 29.7 (SD, 5.1), respectively. Body mass index was significantly lower in the Pfannenstiel group ($P < .001$). The mean BIS score was 18.9 (SD, 1.8), and the CS questionnaire score was 19.3 (SD, 4,7). The BIS score was significantly better in donors with Pfannenstiel incisions ($P < .001$), but there was no statistical significance in CS score. The total rate of wound infection was 4.8%, and rate of incisional hernia was 4.8%. The rate of incisional hernia was more frequent in donors with paramedian incision (5.2%), but there was no statistical significance. Six donors (2.9%) required rehospitalization because of incision site complications.

Conclusion. Hand-assisted retroperitoneoscopic donor nephrectomy avoids intra-abdominal complications, but rate of incision site complications can be higher in hand-assisted procedure. The donors were convinced from the cosmetic outcome after HARP donor nephrectomy. The ones who had Pfannenstiel incision had better satisfaction according to BIS score.

MINIMALLY invasive surgical technique in donor nephrectomy has been widely accepted as a safe procedure, with multiple benefits compared with open donor nephrectomy [1,2]. In 1995, Ratner et al [3] defined laparoscopic donor nephrectomy as offering less post-operative pain and a quick return to normal activities as well

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Table 1. Donor Descriptive and Outcomes by the Incision Site

	Total (n = 209)	HARP-Pm (n = 191)	HARP-Pf (n = 18)	*P* Value
Sex, F/M (% F)	121/88 (57.9)	109/82 (57.1)	12/6 (66.7)	.43*
Age, mean (SD), y	49.1 (11.8)	50 (11.4)	39.3 (11.8)	.001†,‡
BMI, mean (SD), kg/m^2	29.6 (5.05)	30 (5.05)	25.8 (3.3)	< .001†
Follow-up period, mean(SD), mo	54.7 (27.3)	54.1 (26.7)	60.5 (32.9)	.36†
Body image score, mean (SD); median	18.9 (1.8); 20	18.9 (1.8); 20	19.7 (0.67); 20	.04§,‖
Cosmetic(scar test) score, mean (SD); median	19.3 (4.7); 21	19.2 (4.8); 21	20.6 (3.6); 21.5	.38‖
Incisional hernia, No. (%)	10 (4.8)	10 (5.2)	0 (0)	> .99¶
Wound infection, No. (%)	10 (4.8)	9 (4.7)	1 (5.6)	.60¶
Rehospitalization secondary to complications, No. (%)	6 (2.9)	5 (2.6)	1 (5.6)	.42¶

Abbreviations: BMI, body mass index; F, female; HARP, hand-assisted retroperitoneoscopic; M, male; Pf, Pfannenstiel; Pm, paramedian.
*χ^2 test.
†Independent samples test.
‡$P < .01$.
§$P < .05$.
‖Mann-Whitney test.
¶Fisher exact test.

as a higher patient satisfaction compared with an open donor nephrectomy; however, complication rates and graft function appeared to be comparable. The technique does, however, have the risk of intraperitoneal complications, such as splenic or intestinal injuries [1,4,5]. Later, Wadstrom et al defined hand-assisted retroperitoneoscopic donor nephrectomy (HARP), which combines the benefits of minimally invasive surgery with the preservation of peritoneal integrity [6]. The technique showed low intraoperative complication rates [7,8], but Halgrimson et al [9] reviewed the literature, and their data suggested donors who underwent hand-assisted donor nephrectomy have greater incision morbidity compared with pure minimal invasive surgery. One significant concern of a transplant surgeon is to improve donor quality of life after a living kidney donation. Therefore, incision site results such as body image and cosmesis may be important factors when defining a donors' level of satisfaction. In this study, we aimed to evaluate long-term incision-related complication rates and cosmetic outcomes after HARP donor nephrectomy.

MATERIALS AND METHODS

All donors underwent HARP donor nephrectomy between February 2009 and June 2016. They were invited for a physical examination and a face-to-face interview. Twelve months from donation to the study was established as the important period for any occurrence of incision site complications and any remodeling process of the scar; therefore, any shorter time interval was excluded from the study. Sex, age, body mass index (BMI), mean follow-up period, incision-related outcomes of cosmesis, and postoperative complications were evaluated. Dunker et al [10] defined a body image questionnaire (BIQ) that included a body image scale (BIS) and a cosmetic scale (CS). The BIS was based on 5 questions investigating the attitude of donors toward their bodily appearance. It was calculated by reverse scoring, and the total score was between 5 and 20. The CS was based on 3 questions regarding the degree of satisfaction with the appearance of the donor's scar. The total score on this subscale was between 3 and 24. For both questionnaires, a higher score indicated greater cosmetic satisfaction. The BIQ was applied by an independent psychologist to avoid affecting the donors' decisions.

Data about the incision site complications were collected from both follow-up program records and direct physical examinations. Wound infections, incisional hernia (IH), and the need of rehospitalization was recorded. In the case of a clinical suspicion about a hernia, patients were evaluated with ultrasonography.

Surgical Technique

Hand-assisted retroperitoneoscopic donor nephrectomy was performed with the patient placed in a lateral decubitus position and the operating table minimally flexed. They had two 12-mm trocar incisions (subxiphoid, anterior subcostal) and a 7- to 8-cm lower paramedian or a low transverse incision for hand port insertion (Endopath Dextrus; Ethicon GmbH, Norderstedt, Germany). The proximal end of the paramedian incision was always below the umbilical line. After the kidney extraction, both layers of fascia were closed with a single layer interrupted polydioxanone suture (PDS 1–0; Ethicon GmbH). The subcutaneous tissue was closed with a polyglactin 910 suture (Vicryl 0-UR6; Ethicon GmbH). All skin defects were sutured intracutaneously with a polyglactin 910 suture (Vicryl Rapide 4–0; Ethicon GmbH). Fascial defects caused by the 12-mm trocars were sutured using an interrupted polyglactin 910 suture (Vicryl 0-UR6; Ethicon GmbH).

Statistical Analysis

Statistical analysis was performed by the Number Cruncher Statistical System 2007 Statistical Software (NCSS LLC, Kaysville, Utah, United States). Differences in continuous variables were compared with the Mann-Whitney test. Categorical variables were analyzed by χ^2 test. Qualitative data were analyzed by the Fisher exact test. For comparison with norm values, 1-sample *t* tests were calculated. Correlations were determined by Spearman correlation coefficient. A P value $< .05$ was considered statistically significant.

RESULTS

A total of 609 consecutive donors underwent donor nephrectomy during the study period, and 209 of them participated in the study. The reason of nonacceptance or nonparticipation in this study was 4 donors died of unrelated causes of the donation, 27 donors were from foreign

Table 2. Assessment of Cosmetic Perception and Incision Site Complications by Demographic

					Incisional Hernia		Wound Infection	
		Cosmetic Score	Body Image Score		Yes	No	Yes	No
Sex								
Female	Mean (SD)	19.62 (4.57)	19.07 (1.76)	No.	6	115	3	118
	Min-max (median)	3–24 (21)	10–20 (20)	%	5.0	95.0	2.5	97.5
Male	Mean (SD)	18.97 (4.98)	18.75 (1.82)	No.	4	84	7	81
	Min-max (median)	3–24 (20)	14–20 (20)	%	4.5	95.5	8.0	92.0
P Value		.48[*]	.08[*]		> .99[†]		.10[†]	
Age, y	*r*	0.260	0.111	Mean (SD)	55.20 (11.91)	48.82 (11.74)	43.20 (11.15)	49.43 (11.78)
	P Value	.001[‡,§]	.110	Min-max (median)	31–67 (59)	22–79 (49)	24–61 (44.5)	22–79 (50)
				P Value	.05*		.12*	
BMI, kg/m^2	*r*	0.074	−0.010	Mean (SD)	32.82 (4.46)	29.46 (4.98)	27.18 (5.61)	29.75 (4.95)
	P Value	.89[‡]	.89[‡]	Min-max (median)	27.1–41.9 (32.9)	18.1–45.2 (28.9)	18.5–36.5 (26.1)	18.1–45.2 (29.1)
				P Value	.03[*,‖]		.12[*]	

Abbreviation: BMI, body mass index.
[*]Mann-Whitney test.
[†]Fisher exact test.
[‡]Spearman correlation analysis.
[§]$P < .01$.
[‖]$P < .05$.

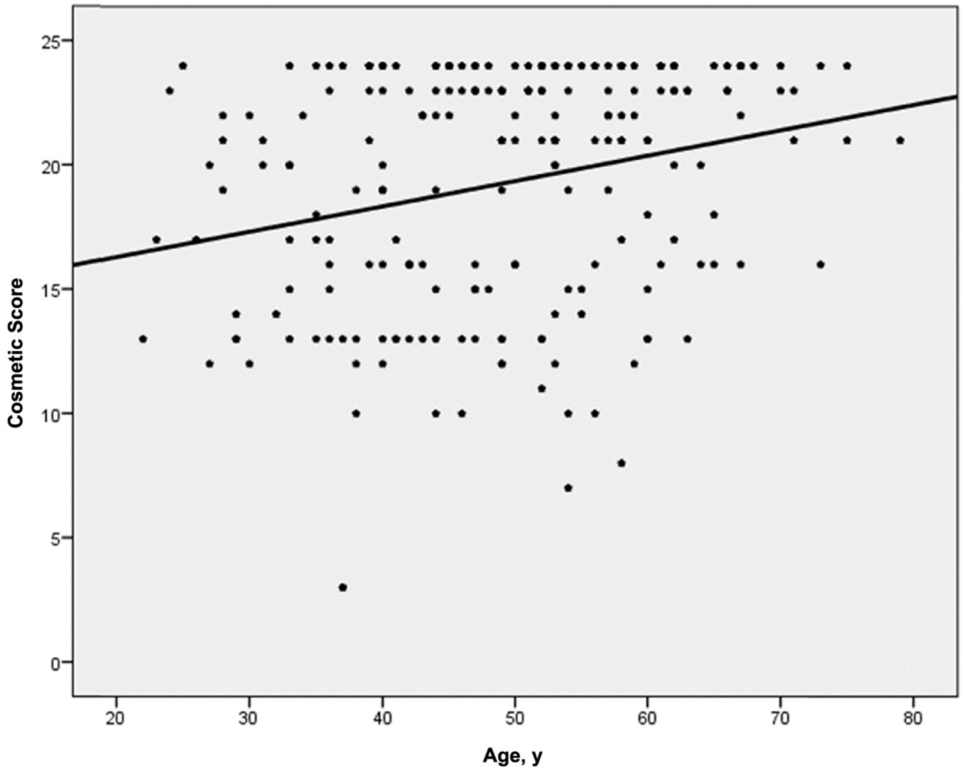

Fig 1. Correlation Diagram Between Age and Cosmetic Score.

countries, 300 donors were living outside the city, and the remainder did not volunteer to take part in the study. The intraoperative and postoperative outcomes regarding incision site are listed in Table 1.

A total of 191 donors had a paramedian (91.4%) and 18 donors had a Pfannenstiel incision (8.6%); 121 donors were female (57.9%). The donor mean age was 49.1 (SD, 11.8) years, and the mean BMI of donors was 29.7 (SD, 5.1) kg/m^2. The donors in the Pfannenstiel group tended to be younger ($P = .001$) and thinner ($P < .001$). The mean follow-up period was 54.7 (SD, 27.3) months. The BIS and CS results revealed almost perfect cosmetic satisfaction in both groups, but the BIS score was significantly higher in the Pfannenstiel group ($P = .04$). All the IHs were detected in the paramedian group (5.2%). The mean wound infection and rehospitalization related to the surgical complications rates were 4.8% and 2.9%, respectively, but there was no statistical significance between the 2 groups.

We assessed the impact of demographics, including age, sex, and BMI, on both postoperative complications and cosmetic perceptions (Table 2). There was no significant relationship among sex, the CS and BIS scores, and incision site complication rates including hernia, and infection ($P > .05$). There was a positive correlation between age and the CS score ($r = 0.260$; $P < .05$) (Fig 1), but no correlation was detected between age and BIS. Incision-related complication was more frequent in older donors, but it was not statistically significant. The rate of IH was significantly greater in donors having BMI > 30 ($P < .05$). However, we did not determine any relationship between BMI and CS or BIS.

Evaluation of the relationships between an incisional hernia and the CS or BIS scores revealed no statistical significance, but the BIS score was significantly lower in donors who had a wound infection after nephrectomy ($P < .05$) (Table 3).

DISCUSSION

Hand-assisted retroperitoneoscopic donor nephrectomy is a feasible and safe approach for the procurement of living kidney donors, combining the advantages of minimal invasive surgery and open donor nephrectomy. It is less painful, has better cosmetic results, and has an earlier recovery compared with an open surgical technique. In addition, there are less bowel complications as the integrity of abdominal cavity is protected [11,12]. We switched our surgical technique from hand-assisted laparoscopy to HARP in 2009, and from then until the end of 2016 we have carried out 609 consecutive cases using this same surgical technique. We made a technical modification from the original style by using a paramedian incision for the hand port placement. The low transverse incision (Pfannenstiel) has a cosmetic advantage; however, it can be more

Table 3. Assessment of Cosmetic and Body Image Score by Incision Site Complications

		Cosmetic Score		Body Image Score	
		Mean (SD)	Min-max (median)	Mean (SD)	Min-max (median)
Incisional hernia	Yes (n = 11)	19.10 (4.09)	12–24 (20.5)	19.10 (1.85)	14–20 (20)
	No (n = 206)	19.36 (4.78)	3–24 (21)	18.93 (1.79)	10–20 (20)
P Value*		.63		.82	
Wound infection	Yes (n = 11)	17.40 (6.05)	3–24 (19)	17.80 (2.30)	14–20 (19)
	No (n = 206)	19.44 (4.66)	3–24 (21)	18.99 (1.75)	10–20 (20)
P Value*		.23		.01†	

*Mann-Whitney test.
†$P < .05$.

demanding in the case of a larger or longer donor in terms of accessing the upper pole of the kidney. This modification facilitated the dissection of the renal pedicle and made the surgery faster.

We generally performed a paramedian incision for port placement because of its technical advantages, but following this trial, Pfannenstiel incision has become our preferred port placement site.

To our knowledge there are some studies that investigated the cosmetic results of patients that had HARP donor nephrectomy [13], but none of them invited donors or examined and interviewed them face-to-face. This is a long-term retrospective study; nevertheless, rehospitalization secondary to hernia correction or a wound infection is generally an event that will be remembered well. However, when compared with a letter enquiry, a direct examination will assure the determination of asymptomatic IH. In literature, the incisional hernia rate in a hand-assisted donor nephrectomy series was between 0.7% and 3.8%, including different types of skin incisions [11,14], while the total rate was 4.8% in our study. All the hernias were in the paramedian group (5.2%), and there were none in the Pfannenstiel group. However, considering that the donors in the Pfannenstiel group were more often young and mainly thin, the lower rate of postoperative complications should be given careful consideration. The mean BMI of donors in our study was one of the highest when compared with the literature [12], and the paramedian group was significantly more obese. Our analysis demonstrated a relationship between the obese donors having a paramedian incision and a higher risk of hernia occurrence. The significance of this finding should be carefully evaluated, as the findings could be an accurate result and be related to the implementation of a direct physical examination and an ultrasonographic detection in suspect cases. More research on this topic is needed in a larger sample group of donors who developed an incisional herniation after donor nephrectomy. Compared with the literature, the prevalence of wound site infection was more frequent [14,15], and it was significantly related to BIS. In our study, wound infection revealed a negative impact on donors' quality of life; however, in contrast to the study by Snyder et al, we did not determine any association between IH and donor cosmetic outcomes [16].

The cosmetic outcome changes according to the degree of interest patients have in cosmesis, and that differs in each patient regarding expectations and demographics, including age, sex, and BMI. In our study, donors were satisfied with their cosmetic outcome, and BIQ scores were comparable with the other donor nephrectomy techniques published in literature [17,18]. The CS was not influenced by the incision site; however, the donors in the Pfannenstiel group were significantly more satisfied according to the BIS scores compared with the paramedian group. This situation could be related to the asymmetric view of the paramedian incision. Sex and BMI did not affect the cosmetic outcomes of the donors in our study, but age revealed a significantly positive correlation with CS, and this could be related to a decreasing cosmetic expectancy.

Our study was cross-sectional; therefore, we examined all the participants during a short period of time. However, it had a few limitations. First, the study participation involved only 34.3% of donors because of the reasons explained previously, but our data is reliable and well-protected from external effects. Second, the patients were not randomized, and the 2 groups separated according to their incision sites were unbalanced. Therefore, our study might be impeded in detecting significant differences, especially in the Pfannenstiel group. In conclusion, HARP donor nephrectomy avoids intra-abdominal complications, but the rate of incision site complications can be higher in hand-assisted procedures. The donors were satisfied with the cosmetic outcome after the surgical procedure.

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